pared with the corresponding month of the last 3 years the dates of occurrence of fog east of the 65th meridian numbered 3 less than the average; west of the 65th meridian the dates of fog numbered one more than the average.

The fog reported along the trans-Atlantic routes west of the 40th meridian, and at Weather Bureau stations along the New England and middle Atlantic coasts, generally attended the advance or passage of general storms.

OCEAN ICE IN JULY.

The table below shows that for July, 1891, ice was reported about ½° north and about 5° west of the average eastern and southern limits of Arctic ice for the month as determined from reports of the last 8 years. The southernmost ice reported was a large iceberg observed on the 28th, and the easternmost ice reported was a large iceberg noted on the 7th in the positions given in the table. The ice reported was confined to the regions lying between the southeast Newfoundland coast and the 48th meridian, and from the 50th meridian through the Straits of Belle Isle. Numerous large icebergs and heavy pack ice were reported in the Straits of Belle Isle throughout the month. Compared with the corresponding month of previous years the ice reported for the current month was deficient in quantity. The positions of icebergs and field ice reported for July, 1891, are shown on Chart I by ruled shading.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for July during the last 8 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
July, 1883	42 42	49 57	July, 1883	46 47	45 44
July, 1884	46 24	50 02	July, 1884	48 36	46 28
July, 1885	42 14	48 30	July, 1885	48 00	44 00
July, 1886	42 59	49 18	July, 1886*	45 52	34 30
July, 1887	43 30	50 05	July, 1887	52 04	41 16
July, 1888	46 30	54 00	July, 1888	47 40	50 10
July, 1889	44 49	47 45	July, 1889	45 50	40 00
July, 1890	41 25	47 30	July, 1890†	50 08	38 45
July, 1891	43 16	49 45	July, 1891	47 02	48 00
Mean	43 45	49 19	Mean	48 00	42 59

*An iceberg and field ice. † On the 10th a small piece of ice was reported in N. 48° 33′, W. 24° 11′.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for July, 1891, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

At stations on the Southern Pacific Railroad, in the east part of San Diego county, Cal., and at Furnace Creek, Death Valley, Cal., the mean temperature was above 100. The mean temperature was above 90 in adjoining parts of Arizona and southeast California, and was above 80 in Florida, southern Georgia, along the immediate east Gulf coast, in Louisiana, Texas, extreme southern New Mexico, southern and western Arizona, in California south of the 37th parallel, except along the coast, and in the San Joaquin and Sacramento valleys. The mean temperature was lowest at elevated stations in central Colorado, where it was below 50, and it was below 60 in extreme eastern and western Nova Scotia, the lower Saint Lawrence valley, over the north part of the upper lake region, in Manitoba, and along the immediate Pacific coast north of San Francisco, Cal.

DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally above the normal from Alberta and British Columbia southward over the Pacific coast states, and from the southern plateau region over the Rio Grande Valley. It was also slightly above the normal in the lower Saint Lawrence Valley. Over the middle plateau region, and from the eastern slope of the Rocky Mountains to the Atlantic coast from southern Florida to Nova Scotia, the mean temperature was below the normal. The greatest departure above the normal temperature was noted in the Sacramento Valley, where it exceeded 2, and the greatest departure below the normal temperature occurred in the Lake region, the Missouri, upper Mississippi, and upper Ohio valleys, and in the western part of the middle and south Atlantic states, where it exceeded 5.

TEMPERATURE, JANUARY TO JULY.

For the period January to July, inclusive, the mean temperature averaged above the normal in the middle Atlantic and New England states, the Lake region, extreme northwest, and over the northern plateau region; elsewhere it was deficient. In the Lake region, the extreme northwest, and over the northern plateau the excess was about 1. On the northeast and middle-eastern slopes of the Rocky Mountains and over the middle and southern plateau regions there was a deficiency of about 2, and at Key West, Fla., in the west Gulf states, the Missouri Valley, and on the southeast slope of the Rocky Mountains the deficiency was about 1.

PERIODS OF HIGH TEMPERATURE.

Exceptionally high temperature prevailed in Washington and Oregon from the 22d to the 24th, and this condition extended over California on the 24th, and during the 24th and 25th the temperature was the highest ever reported at a number of stations in the Pacific coast states.

PERIODS OF LOW TEMPERATURE.

From the 7th to 10th exceptionally cool weather prevailed from the Mississippi Valley eastward to the middle Atlantic and North Carolina coasts, the temperature being 2 to 5 lower than previously reported for the season. The morning of the 18th the temperature was 2 to 10 below the mean in all districts lying east of the Rocky Mountains, except Maine. On the 27th the lowest temperature on record for the season was noted in western New York, northwestern Pennsylvania, and northern Ohio, where the temperature was 1 to 4 below the lowest previously reported for the third decade of July.

YEARS OF HIGHEST MEAN TEMPERATURE IN JULY.

The mean temperature for the current month was the highest ever reported for July at Sacramento, Los Angeles, and San Diego, Cal. In the middle Mississippi and Ohio valleys, the lower lake region, Pennsylvania, New York, and New Jersey the highest mean temperature for July occurred in 1887, when the mean was 4 to 5 above the normal, and in the upper lake region in 1878, when the mean was 3 to 5 above the normal.

YEARS OF LOWEST MEAN TEMPERATURE IN JULY.

The current month was the coolest July on record from the Red River of the North Valley and the middle-eastern slope of the Rocky Mountains eastward to the Atlantic coast north of

the 35th parallel, and at Salt Lake City, Utah. In North Dakota and Montana the lowest mean temperature for July occurred in 1884, when the mean was 4 to 6 below the normal.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for July for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for July, 1891; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for July, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of July.	(2) Length of record.	(3) Mean for July, 1891.	(4) Departure from normal.	(5) Extreme monthly mean for July.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	*Years*	°	°	°		°	
Lead Hill	Boone	81.7	9	77.7	— 4.0	84.2	1888	75.2	1882
California.									
Sacramento	Sacramento	72.9	38	70.6	— 2.3	80.6	1854	68.3	1889
Connecticut.									
Middletown	Middlesex	70.9	23	67.0	— 3.9	75.4	1886	66.9	1860
Florida.									
Merritts Island	Brevard	80.5	9	82.8	+ 2.3	82.8	1891	78.5	1886
Georgia.									
Forsyth	Monroe	82.1	17	79.3	— 2.8	85.7	1881	78.3	1882
Illinois.									
Peoria	Peoria	78.3	35	72.7	— 5.6	83.2	1887	71.2	1885
Riley	McHenry	71.5	35	65.4	— 6.1	80.2	1868	65.4	1891
Indiana.									
Vevay	Switzerland	77.6	25	72.2	— 5.4	84.3	1868	72.2	1891
Iowa.									
Cresco	Howard	71.2	18	65.1	— 6.1	75.2	1874	65.1	1891
Monticello	Jones	73.0	37	68.4	— 4.6	79.3	1868	63.2	1863
Logan	Harrison	75.6	17	71.7	— 3.9	79.5	1881	69.8	1882
Kansas.									
Lawrence	Douglas	78.4	29	72.0	— 6.4	85.1	1868	72.0	'91*
Wellington	Sumner	78.7	12	75.1	— 3.6	83.9	1879	73.0	1882
Louisiana.									
Grand Coteau	Saint Landry	82.5	7	.....	.....	85.4	1884	81.4	1890
Maine.									
Orono	Penobscot	67.0	21	65.3	— 1.7	71.0	1887	64.2	1884
Maryland.									
Cumberland	Allegany	72.2	31	68.7	— 3.5	77.7	1887	67.4	1860
Massachusetts.									
Amherst	Hampshire	70.8	55	66.5	— 4.3	76.1	1887	66.4	1860
Newburyport	Essex	69.1	13	67.1	— 2.0	71.1	1882	67.1	1891
Somerset	Bristol	74.0	19	71.1	— 2.9	77.9	1876	71.1	1891
Michigan.									
Kalamazoo	Kalamazoo	72.6	14	67.2	— 5.4	77.8	1885	67.2	1891
Thornville	Lapeer	71.8	14	67.4	— 4.4	76.2	1887	67.4	1891
Minnesota.									
Minneapolis	Hennepin	71.2	26	66.1	— 5.1	77.2	1866	65.8	1882
Montana.									
Fort Shaw	Lewis & Clarke	68.5	22	64.2	— 4.3	74.1	1886	61.5	1884
New Hampshire.									
Hanover	Grafton	69.4	48	66.7	— 2.7	72.4	1870	62.3	1844
New Jersey.									
Moorestown	Burlington	75.1	28	69.6	— 5.5	78.8	1863	69.6	1891
South Orange	Essex	73.0	20	68.2	— 4.8	77.8	1876	68.2	1891
New York.									
Cooperstown	Otsego	68.4	37	63.3	— 5.1	73.4	1854, '70	62.7	1860
Palermo	Oswego	69.5	37	65.0	— 4.5	76.6	1864	62.3	1860
North Carolina.									
Lenoir	Caldwell	74.7	18	71.3	— 3.4	77.7	1877	66.4	1884
Ohio.									
N'th Lewisburgh	Champaign	73.5	59	71.7	— 1.8	81.0	1887	68.0	1835, '47
Wauseon	Fulton	72.7	21	68.4	— 4.3	77.1	1887	67.7	1882
Oregon.									
Albany	Linn	66.2	13	65.6	— 0.6	69.9	1889	63.2	1881
Eola	Polk	64.6	21	64.1	— 0.5	70.3	1889	59.6	1888
Pennsylvania.									
Dyberry	Wayne	68.1	23	63.0	— 5.1	72.6	1887	63.0	1891
Grampian Hills	Clearfield	70.7	27	65.4	— 5.3	76.8	1887	65.4	1891
Wellsborough	Tioga	70.1	12	60.4	— 9.7	76.1	1881	60.4	1891
South Carolina.									
Statesburgh	Sumter	78.7	10	74.6	— 4.1	84.0	1881	74.6	1891
Tennessee.									
Austin	Wilson	79.6	23	76.3	— 3.3	85.2	1879	71.6	1885
Texas.									
New Ulm	Austin	82.7	19	82.4	— 0.3	85.0	1879	80.6	1880
Vermont.									
Strafford	Orange	69.4	18	65.7	— 3.7	73.5	1887	65.7	1891
Virginia.									
Birdsnest	Northampt'n	78.8	23	74.6	— 4.2	84.0	1887	74.3	1871
Washington.									
Fort Townsend	Jefferson	61.7	17	59.7	— 2.0	66.1	1875	58.7	1879
Wisconsin.									
Madison	Dane	72.0	22	66.6	— 5.4	75.8	1859	66.6	1891

*Occurred in 1882 also.

MAXIMUM TEMPERATURE.

The highest temperature ever reported by a regular station of the Weather Bureau in July was 118, at Yuma, Ariz., in 1878, and by a voluntary observer, 128, at Mammoth Tank, in the Colorado Desert, Cal., in 1887.

In July, 1891, the temperature was the highest ever reported for July at stations in the interior of the Pacific coast states south of the Columbia River, and at El Paso and San Antonio, Tex.

For the current month the temperature rose above 120 in the Colorado Desert, and at Furnace Creek, Death Valley, Cal.; it was above 110 in the Sacramento, San Joaquin, and lower Colorado valleys; and was above 100 at stations in the interior of the Pacific coast states south of the Columbia River, and over a greater part of Texas. The reports of voluntary observers show maximum temperature above 100 in west-central Maine, in parts of the Gulf States, southern Illinois, and at several stations in the Missouri Valley and Rocky Mountain and plateau regions. The lowest maximum temperature was 66, at Eureka, Cal., and the maximum values were below 80 on the north Washington and north California coasts, at points on the extreme east and southeast New England coasts, and at Atlantic City, N. J.

MINIMUM TEMPERATURE.

The temperature was generally the lowest ever reported for July in districts lying east of the 100th meridian, and at Salt Lake City, Utah, and Walla Walla, Wash.

The lowest temperature reported by a regular station of the Weather Bureau was 37, at Saint Vincent, Minn. The temperature fell below 45 north of a line traced from Maine westward over the south part of the Lake region, thence northwest to northeastern Minnesota, thence southwest to central New Mexico and central Arizona, thence northwest to extreme west-central Nevada, thence northward to northeast Oregon, and thence northwest to extreme northwestern Washington. The reports of voluntary observers show temperature falling to or below 32 at points in the middle Rocky Mountain region, the lowest reading reported being 10, at Breckenridge, Colo. The highest minimum temperature reported was 72, at Brownsville, Tex., and Furnace Creek, Death Valley, Cal., and the minimum temperature was 70 in extreme southern Texas, and in south Florida.

RANGES OF TEMPERATURE.

The greatest daily range of temperature is given in the table of miscellaneous data. The greatest monthly ranges of temperature were noted over the northern and middle plateau regions and in the interior of the Pacific coast states, where they were more than 55, whence they decreased to less than 40 on the north Pacific coast, to 20 at Eureka, Cal., to 31 at San Francisco, Cal., and to 30 at San Diego, Cal. East of the Rocky Mountain regions the monthly ranges decreased to less than 30 on the southeast New England and New Jersey coasts, to 19 at Hatteras, N. C., to 20 over south Florida, and to less than 30 along the immediate Gulf coast.

FROST.

Frost injurious to vegetation was reported as follows: at Happy Valley, Oregon, on the 6th; in the country about Sault de Ste. Marie, Mich., and in Green Lake Co., Wis., on the 8th; at Ball Mountain and Marshall, Mich., on the 19th; light frost in the upper, and the northern portion of the lower, peninsula of Michigan, on the 20th; at Elkton, S. Dak., on the 24th; at Marshall, Mich., on the 25th; at Corry, Pa., Hudson and Marshall, Mich., on the 27th; at Barkhempstead, Conn., on the 28th; and at points in northern lower Michigan on the 30th and 31st.

The killing frost of the last two days of the month in Michigan was more than two months late, and that of the 28th in Connecticut was more than three months late, when compared with the average date of last killing frost in the respective localities.